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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/732,966	12/10/2003	Hung Chih Chen	8402 USA/AGS/LAP	9309

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12/06/2006

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EXAMINER

MACARTHUR, SYLVIA

ART UNIT	PAPER NUMBER
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1763

DATE MAILED: 12/06/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/732,966

Applicant(s)

CHEN ET AL.

Examiner

Sylvia R. MacArthur

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 11 September 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-5 and 7-21 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-5 and 7-21 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 15 October 2004 is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date 7/11/2006.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____.

DETAILED ACTION

Request for Continued Examination (RCE)

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 9/11/2006 has been entered.

Response to Arguments

2. Applicant's arguments filed 9/11/2006 have been fully considered but they are not persuasive. The prior art of Kajiwara et al has been maintained as it does illustrate radial grooves 240 (channels) that have similar size, shape, and dimensions and annular recess 215.

The prior of Hiroshi was also introduced to provide a teaching of the channels and optimized shapes and sizes.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1-5, 7-9, and 18-21 are rejected under 35 U.S.C. 102(b) as being anticipated by Sato Hiroshi (JP 08-11055).

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Regarding claim 1: Hiroshi teaches a retaining ring (holding part 4) comprising: a generally annular body having a top surface, a bottom surface, an inner diameter surface, and an outer diameter surface, wherein the bottom surface includes a plurality of channels (slots/grooves 5), see Figs.7, 3a, and b. Each channel extends from the inner diameter surface to the outer diameter surface and having a curved section defining a rounded ceiling and substantially vertical side walls, wherein a distance between the sidewalls is constant from the bottom surface to the curved section and the sidewalls have a length that is greater than the depth of the curved section, see [0055].

Regarding claim 2: See Fig. 7 and [0055].

Regarding claim 3: Fig. 3 b, Fig. 7b, and Fig. 8 b depicts a semicircular cross-section has a diameter about equal to a width of the channel.

Regarding claims 4 and 5: See Fig. 7.

Regarding claim 7: Uniform depth as depicted in the Figures.

Regarding claim 8: See [0036] and [0052] and the disclosed figures.

Regarding claim 9: This claimed range overlaps the range of 0-90 degrees, as seen in 0036] and [0052].

Regarding claim 18: See Figs. 1-3.

Regarding claim 19: Fig. 9 depicts a substrate receiving surface (flat top board 3). teaches a retaining ring (holding part 4) comprising: a generally annular body having a top surface, a bottom surface, an inner diameter surface, and an outer diameter surface, wherein the bottom surface includes a plurality of channels (slots/grooves 5), see Figs.7, 3a, and b. Each channel

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extends from the inner diameter surface to the outer diameter surface and having a curved section defining a rounded ceiling and substantially vertical side walls, wherein a distance between the sidewalls is constant from the bottom surface to the curved section and the sidewalls have a length that is greater than the depth of the curved section, see [0055].

Regarding claim 20: Sections [002] – [007] and Fig. 9 depicts creating relative motion between a substrate and a polishing surface, and). teaches a retaining ring (holding part 4) comprising: a generally annular body having a top surface, a bottom surface, an inner diameter surface, and an outer diameter surface, wherein the bottom surface includes a plurality of channels (slots/grooves 5), see Figs. 7, 3a, and b. Each channel extends from the inner diameter surface to the outer diameter surface and having a curved section defining a rounded ceiling and substantially vertical side walls, wherein a distance between the sidewalls is constant from the bottom surface to the curved section and the sidewalls have a length that is greater than the depth of the curved section, see [0055].

Regarding claim 21: Section [0063] teaches a depth of 1mm, which is 0.0039 in.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 1-5, 7-9, 13, and 18-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kajiwara et al (WO 02/098608).

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Kajiwara et al teaches a CMP apparatus having a retaining ring with a contoured surface. Regarding claim 1: Kajiwara teaches a generally annular body (170) having a top surface, a bottom surface, an inner diameter surface, and an outer diameter surface, wherein the bottom surface includes a plurality of channels (radial grooves 240), each channel extending from the inner diameter surface to the outer diameter surface and having a rounded ceiling see Fig. 8, 11B and 12 and page 16 lines 3-15. The shape of the channels is spiral shaped, see Fig.8. In Fig. 8 the radial grooves have dimensions similar to those of the recess 215. Figs. 11B and 12 depict annular recess 215 has having curved cross-section defining a rounded ceiling and substantially vertical side-walls. Page 16 lines 10-14 recite that radial grooves 240 have a width of 0.1 to 10mm and a depth of 0.1 to about 5mm. The ranges of width and depth overlap each other but were not specifically taught as recited by claim 1 of the present invention. Kajiwara et al teaches that the motivation to vary the shape and size of the recess 215 can reduce the rebound effect for polishing pads having properties that vary over time. Likewise, the motivation to optimize the design of the size and shape of radial grooves 240 is to enhance their ability to distribute the slurry between the polishing surface and the substrate, see page 16 lines 5-15. Furthermore, it was held by *In re Dailey*, 357 F. 2d 69, 149 USPQ 47 (CCPA 19660 that shape is a matter of choice which a person of ordinary skill in the art would have found obvious absent persuasive evidence that the particular shape was significant. Kajiwara et al teaches that the grooves 240 perform slurry distribution. The motivation to provide the optimal shape of the ceiling of the grooves is to provide the optimal slurry distribution.

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Regarding claim 2: The retaining ring of claim 1, wherein the rounded ceiling of recess 215 (recall the size/shape of recess 215 and grooves 240 can be similar) have a semi-circular cross-section, see Figs. 11B, 12 and page 16 lines 3-15.

Regarding claim 3: The retaining ring of claim 2, wherein the semi-circular cross-section recess 215 (recall the size/shape of recess 215 and grooves 240 can be similar as taught by Kajiwara et al page 16 lines 3-25) has a diameter about equal to a width of the channel, see Fig 12.

Regarding claim 4: The retaining ring of claim 1, wherein the rounded ceiling recess 215 (recall the size/shape of recess 215 and grooves 240 can be similar) has a flat ceiling, see Fig. 11B.

Regarding claim 5: The retaining ring of claim 4, wherein the rounded ceiling recess 215 (recall the size/shape of recess 215 and grooves 240 can be similar) is rounded at an intersection of the flat portion and vertical side-walls of the channel (grooves 240), see Fig. 11B.

Regarding claim 7: The retaining ring of claim 1, wherein the plurality of channels (grooves 240), have substantially uniform depth, see Fig. 15B.

Regarding claim 8: The retaining ring of claim 1, wherein the plurality of channels (grooves 240), (recall the size/shape of recess 215 and grooves 240 can be similar) are oriented at an angle relative to a radial segment extending through the center of the retaining ring, see Fig 8.

Regarding claim 9: Kajiwara et al fails to teach the retaining ring of claim 8, wherein the angle is between 30 and 60 degrees.

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However, Kajiware et al does teach on page 16 lines 4-25 that the actual location of the recesses is a matter of optimization so that the slurry can be distributed to the substrate. It would have been obvious to one having ordinary skill in the art to have determined the optimum value of cause effective variables such as the angle of orientation of the channels in the absence of a showing of criticality, see *In re Woodruff*, 16 USPQ 2d 1934, 1936 (Fed. Cir. 1990). Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to provide the recesses of Kajiware et al at an angle range of 30 to 60 degrees in order to accommodate the force caused by polishing.

Regarding claim 13: The retaining ring of claim 1, wherein the annular body comprises a wearable material, see page 7 lines 15-29 of Kajiware et al.

Regarding claim 18: The retaining ring of claim 1, wherein the plurality of channel(grooves 240), (recall the size/shape of recess 215 and grooves 240 can be similar) are distributed at substantially equal angular intervals around the retaining ring, see Figs. 15B of Kajiware et al..

Regarding claim 19: Kajiware et al teaches a carrier head comprising:
a substrate receiving surface (155), a generally annular retaining ring (170) surrounding the substrate receiving surface, the retaining ring having a top surface, a bottom surface, an inner diameter surface, and an outer diameter surface, wherein the bottom surface includes a plurality of channels (grooves 240), each channel(grooves 240), (recall the size/shape of recess 215 and grooves 240 can be similar) extending from the inner diameter surface to the outer diameter surface and having a rounded ceiling, see Fig. 12 as Kajiware et al teaches that the dimensions of the channels 215 and grooves 240 can be similar .

Regarding claim 20: Kajiware et al teaches a method of polishing, comprising:

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creating relative motion between a substrate and a polishing surface, restraining the substrate with retaining ring that has a top surface, a bottom surface, an inner diameter surface, and an outer diameter surface, wherein the bottom surface includes a plurality of channels, each channel extending from the inner diameter surface to the outer diameter surface and having a rounded ceiling, and supplying a polishing liquid to the polishing surface so that the polishing liquid flows through the channels and beneath the retaining ring to the substrate, see title, abstract, and Figs. 11B, 12 and 15B of Kajiwara et al.

Regarding claim 21: Kajiwara et al teaches that the dimensions of the grooves 240 and the annular recess are similar. In page 14 lines 28-32, Kajiwara et al teaches that the depth of the recess (and groove) is 0.1 to 5mm. This range overlaps with the depth of at least 0.030 inches, which is approximately 1mm.

7. Claims 10-12 and 14-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kajiwara et al in view of DeMeyer et al.

The teachings of Kajiwara et al were discussed above.

Kajiwara et al fails to teach that the retaining ring of claim 1, wherein the outer diameter surface includes a ledge.

DeMeyer et al teaches a two retaining ring wherein the outer diameter surface includes a ledge, See Fig 1A. and [0023-0026]. The motivation to provide a ledge is that the design ensures a threaded edge surface and an enhanced assembly surface for the CMP apparatus. Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to provide a ledge in the retaining ring of Kajiwara et al when modified by the teachings of DeMeyer et al.

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Regarding claim 11: Kajiware et al fails to teach the retaining ring of claim 10, wherein the outer diameter surface includes a first portion adjacent the bottom surface that has an outer diameter less than a second portion adjacent the top surface.

This occurs due to the ledge of DeMeyer et al. The motivation to provide a ledge is that the design ensures a threaded edge surface and an enhanced assembly surface for the CMP apparatus. Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to provide a ledge in the retaining ring of Kajiware et al when modified by the teachings of DeMeyer et al.

Regarding claim 12: Recall the retaining ring of Kajiware et al teaches that each channel includes substantially vertical side-walls see Fig. 11, 12, and 15B. It would have been obvious to one having ordinary skill in the art to have determined the optimum value of cause effective variables such as the dimension of the ledge of DeMeyer et al in the absence of a showing of criticality, see *In re Woodruff*, 16 USPQ 2d 1934, 1936 (Fed. Cir. 1990). The motivation to design the side walls extend to substantially the same depth as the ledge is that the dimensions provide the optimal slurry distribution. Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to design the side walls of Kajiware et al to extend to substantially the same depth as the ledge (suggested by DeMeyer et al) is that the dimensions provide the optimal slurry distribution.

Regarding claim 14: Kajiware et al fails to teach the retaining ring of claim 1, wherein the annular body comprises an upper portion and a lower portion, the upper portion being more rigid than the lower portion. DeMeyer et al teaches a two-part retaining ring wherein the upper part is metal and the lower part is made of plastic. The motivation to modify the apparatus of Kajiware

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et al into a two piece construction is that the wearable plastic portion of the ring can be replaced without removing the top portion from the carrier head see [007] of DeMeyer et al. Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to construct the retaining ring of Kajiwara et al with an upper portion and a lower portion, the upper portion being more rigid than the lower portion as suggested by DeMeyer et al.

Regarding claim 15: The retaining ring of claim 14, recall the channels (grooves 240) of Kajiwara et al are formed in the lower portion.

Regarding claim 16: Kajiwara et al fails to teach the retaining ring of claim 15, wherein the lower portion is formed of a wearable material. Note the lower portion of DeMeyer et al is a wearable plastic. . DeMeyer et al teaches a two-part retaining ring wherein the upper part is metal and the lower part is made of plastic. The motivation to modify the apparatus of Kajiwara et al into a two piece construction is that the wearable plastic portion of the ring can be replaced without removing the top portion from the carrier head see [007] of DeMeyer et al. Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to construct the retaining ring of Kajiwara et al with an upper portion and a lower portion, the upper portion being more rigid than the lower portion as suggested by DeMeyer et al.

Regarding claim 17: The retaining ring of claim 15, further comprising a plurality of passages extending through the upper portion from the inner diameter surface to the outer diameter, see the channels of Kajiwara et al.

8. Claims 10-12 and 14-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hiroshi (JP 08-011055) et al in view of DeMeyer et al.

The teachings of Hiroshi were discussed above.

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Hiroshi fails to teach that the retaining ring of claim 1, wherein the outer diameter surface includes a ledge.

DeMeyer et al teaches a two retaining ring wherein the outer diameter surface includes a ledge, See Fig 1A. and [0023-0026]. The motivation to provide a ledge is that the design ensures a threaded edge surface and an enhanced assembly surface for the CMP apparatus. Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to provide a ledge in the retaining ring of Hiroshi when modified by the teachings of DeMeyer et al.

Regarding claim 11: Hiroshi fails to teach the retaining ring of claim 10, wherein the outer diameter surface includes a first portion adjacent the bottom surface that has an outer diameter less than a second portion adjacent the top surface.

This occurs due to the ledge of DeMeyer et al. The motivation to provide a ledge is that the design ensures a threaded edge surface and an enhanced assembly surface for the CMP apparatus. Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to provide a ledge in the retaining ring of Hiroshi when modified by the teachings of DeMeyer et al.

Regarding claim 12: Recall the retaining ring Hiroshi teaches that each channel the bottom surface includes a plurality of channels (slots/grooves 5), see Figs.7, 3a, and b. It would have been obvious to one having ordinary skill in the art to have determined the optimum value of cause effective variables such as the dimension of the ledge in the absence of a showing of criticality, see *In re Woodruff*, 16 USPQ 2d 1934, 1936 (Fed. Cir. 1990). The motivation to design the side walls extend to substantially the same depth as the ledge is that the dimensions provide the optimal slurry distribution.. Thus, it would have been obvious for one of ordinary

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skill in the art at the time of the claimed invention to design the side walls of Hiroshi to extend to substantially the same depth as the ledge (suggested by DeMeyer et al) is that the dimensions provide the optimal slurry distribution.

Regarding claim 14: Hiroshi fails to teach the retaining ring of claim 1, wherein the annular body comprises an upper portion and a lower portion, the upper portion being more rigid than the lower portion. DeMeyer et al teaches a two-part retaining ring wherein the upper part is metal and the lower part is made of plastic. The motivation to modify the apparatus of Hiroshi into a two piece construction is that the wearable plastic portion of the ring can be replaced without removing the top portion from the carrier head see [007] of DeMeyer et al. Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to construct the retaining ring of Hiroshi with an upper portion and a lower portion, the upper portion being more rigid than the lower portion as suggested by DeMeyer et al.

Regarding claim 15: The retaining ring of claim 14, recall the channels (slots 5) of Hiroshi are formed in the lower portion.

Regarding claim 16: Hiroshi fails to teach the retaining ring of claim 15, wherein the lower portion is formed of a wearable material. Note the lower portion of DeMeyer et al is a wearable plastic. . DeMeyer et al teaches a two-part retaining ring wherein the upper part is metal and the lower part is made of plastic. The motivation to modify the apparatus of Hiroshi into a two piece construction is that the wearable plastic portion of the ring can be replaced without removing the top portion from the carrier head see [007] of DeMeyer et al. Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to construct the retaining

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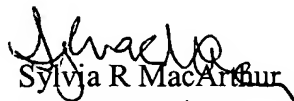
ring of Hiroshi with an upper portion and a lower portion, the upper portion being more rigid than the lower portion as suggested by DeMeyer et al.

Regarding claim 17: The retaining ring of claim 15, further comprising a plurality of passages extending through the upper portion from the inner diameter surface to the outer diameter, see the channels of Hiroshi, see Figs. 1-3.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sylvia R. MacArthur whose telephone number is 571-272-1438. The examiner can normally be reached on M-F during the core hours of 9 a.m. and 3 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on 571-272-1435. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


Sylvia R MacArthur
Patent Examiner
Art Unit 1763

November 27, 2006